

## VPDES PERMIT FACT SHEET

This document gives the pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Minor, Municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9VAC 25-260-00 et seq. The discharge results from domestic sewage from Cedar Rock Wastewater Treatment Plant treated by a Biowheel with ultraviolet disinfection. This permit action consists of updating boilerplate language and revising the dissolved oxygen and BOD<sub>5</sub> limits. (SIC Code: 4952)

1. **Facility Name and Address:**

**Cedar Rock WWTP**  
1725 Old Cifax Road  
Goode, VA 24556

Location: Cedar Rock Drive, Forest, VA

2. **Permit No:** VA0091553      Expiration Date: November 23, 2009

3. **Owner Contact:**      Name: Mr. Chuck Hagerty      Title: Owner, CagNaC, Inc.  
Telephone No: (434) 385-8003

4. **Application Complete Date:**

**Permit Drafted By:**      Kevin A. Harlow      Date: October 2, 2009  
**DEQ Regional Office:**      Blue Ridge Regional Office  
**Reviewed By:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Public Comment Period Dates:** from: \_\_\_\_\_ to: \_\_\_\_\_

5. **Receiving Waters Classification:**

Receiving Stream: UT to Elk Creek      River Basin: Roanoke River      River Subbasin: Roanoke River  
Section: 5a      Class: III      Special Standards:      None  
7-Day, 10-Year Low Flow: 0.07 MGD      7-Day, 10-Year High Flow: 0.31 MGD  
1-Day, 10-Year Low Flow: 0.06 MGD      1-Day, 10-Year High Flow: 0.27 MGD  
30-Day, 5-Year Low Flow: 0.15 MGD      30-Day, 10-Year High Flow: 0.41 MGD  
30-Day, 10-Year Low Flow: 0.10 MGD      Harmonic Mean: 0.42 MGD  
Tidal: No      303(d) Listed: No

**Attachment D** contains a copy of the flow frequency determination memorandum.

6. **Operator License Requirements:** III

7. **Reliability Class:** I

8. **Permit Characterization:**

☐ Private      ☐ Federal      ☐ State      ☐ POTW      ☒ PVOTW

☐ Possible Interstate Effect      ☐ Interim Limits in Other Document

9. **Wastewater Treatment System:**

This wastewater treatment works is designed to service 43 homes in Cedar Rock subdivision. The treatment system consists of a 0.015 MGD Biowheel treatment system. See **Attachment B** for wastewater treatment schematics and **Attachment A** for a copy of the site visit report. Sanitary wastewater from the individual homes is treated in the Biowheel. The Biowheel discharges to an ultraviolet disinfection unit. Following ultraviolet disinfection the effluent is aerated and discharged to an unnamed tributary to Elk Creek. Sludge is contained in the system until it is pumped and hauled by Crowe Septic, LLC of Hardy, VA.

10. **Sewage Sludge Use or Disposal:** A VPDES Sewage Sludge Permit Application Form was submitted for this facility to address disposal of sewage sludge from the wastewater treatment facility. Sludge will be periodically transported by Crowe Septic, LLC of Hardy, VA.

11. **Discharge Location Description:** A USGS topographic map which indicates the discharge location, any significant dischargers, any water intakes, and other items of interest is included in **Attachment C**. The latitude and longitude of the discharge is N 37° 20' 74", E 79° 20' 13".

Name of Topo: Forest    Number: 107D

12. **Material Storage:** Only small amounts of cleaning and lab chemicals will be stored on site.

13. **Ambient Water Quality Information:** Memoranda or other information which helped to develop permit conditions (special water quality studies, STORET data, and any other biological and/or chemical data, etc.) are listed below.

Flow records are available from a continuous record gauge (#02061500) on the Big Otter River near Evington, VA.. The flow frequencies for the discharge point were determined using proportional drainage areas. See **Attachment D** for the flow frequency memorandum for a summary of the flow frequencies.

No chemical monitoring data has been collected on the unnamed tributary to Elk Creek. Background temperature, pH, and hardness data were available from STORET Station 4AECR003.02. This station is located on Elk Creek at the Route 688 bridge. The calculated receiving stream pH and temperature values were derived from data collected from 1992 through 2001. **Attachment E** contains these STORET data.

14. **Antidegradation Review and Comments:** Tier I \_\_\_\_\_ Tier II   X   Tier III \_\_\_\_\_

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier I or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier II water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier II waters is not allowed without an evaluation of the economic and social impacts. Tier III water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or

expanded discharges into exceptional waters.

The antidegradation review begins with Tier determination. The effluent is discharged to an unnamed tributary to Elk Creek in VAW-L25R that is not included in the 303d list as impaired. However, this unnamed tributary enters Elk Creek in a segment that is listed on Part I of the 2008 303(d) list as impaired due to bacteria. The unnamed tributary of Elk Creek is determined to be a Tier II water, and no significant degradation of existing quality is allowed. This determination is based on the fact that there are no data to indicate that this water is not better than the standards for all parameters, other than bacteria, that the Board has adopted criteria.

For purposes of aquatic life protection in Tier II waters, "significant degradation" means that no more than 25 percent of the difference between the acute and chronic aquatic criteria values and the existing quality (unused assimilative capacity) may be allocated. For purposes of human health protection, "significant degradation" means that no more than 10 percent of the difference between the human health criteria and the existing quality (unused assimilative capacity) may be allocated. The antidegradation baseline for aquatic life and human health are calculated for each pollutant as follows:

Antidegradation baseline (aquatic life) =  $0.25 (\text{WQS} - \text{existing quality}) + \text{existing quality}$

Antidegradation baseline (human health) =  $0.10 (\text{WQS} - \text{existing quality}) + \text{existing quality}$

Where:

"WQS" = Numeric criterion listed in 9 VAC 25-260-5 et seq. for the parameter analyzed

"Existing quality" = Concentration of the parameter being analyzed in the receiving stream

These "antidegradation baselines" become the new water quality criteria in Tier II waters and effluent limits for future expansions or new facilities must be written to maintain the antidegradation baselines for each pollutants. Antidegradation baselines have been calculated as described above and included in **Attachment F**. Antidegradation guidelines are applicable and have been applied to this permit issuance because it is a new discharge.

Water quality based effluent limits for pH, ammonia, and dissolved oxygen have been established in compliance with antidegradation requirements set forth in 9 VAC 25-260-30 of the water quality standards regulations. In accordance with antidegradation policy, pH will be maintained within the range of 6.0 S.U. and 9.0 S.U. The ammonia and dissolved oxygen limitations for the discharge have been established to prevent any significant lowering of water quality and identify the quality that must be maintained.

15. **Site Inspection:** Date: 9/12/2008 Performed by: Ryan L. Hendrix  
**Attachment A** contains a copy of the site visit memorandum.

16. **Effluent Screening and Limitation Development:**  
DEQ Guidance Memorandum 00-2011 was used in developing all water quality based limits pursuant to water quality standards (9 VAC 25-260-5 et seq). Refer to **Attachment F** for the facility wasteload allocation spreadsheet, effluent limit calculations, and regional water quality model output. See **Table I** for a summary of the effluent limitations and monitoring

requirements associated with the permit parameters.

**Reduced Monitoring:** All permit applications received after May 4, 1998, are to be considered for reduction in effluent monitoring frequency. GM 98-2005 states that "only facilities having exemplary operations that consistently meet permit requirements should be considered for reduced monitoring." This facility was issued Notice of Violation #W2008-11-W-1004 within the last three years and is therefore ineligible for reduced monitoring.

**A. Mixing Zone**

The MIXER program was run to determine the percentage of the receiving stream flow that could be used in the wasteload allocation calculations. The program output indicated that 100 percent of the 7Q10 and 100 percent of 1Q10 may be used for calculating acute and chronic wasteload allocations (WLAs). A copy of the print out from the MIXER run is enclosed in **Attachment F**.

**B. Effluent Limitations for Conventional Pollutants**

**Flow --** The permittee submitted a VPDES Permit Application for a design flow of **0.015 MGD**. In accordance with the current VPDES Permit Manual, flow is to be estimated and recorded per day of discharge.

**pH --** The pH limits of **6.0 S.U.** minimum and **9.0 S.U.** maximum are required. These limits are based upon the water quality criteria in 9 VAC 25-260-50 for Class III receiving waters and are in accordance with federal technology-based guidelines, 40 CFR Part 133, for secondary treatment. Grab samples shall be collected once per day of discharge.

**Dissolved Oxygen (DO) --** The Regional Water Quality Model for Free Flowing Streams, Version 4.11 was used to evaluate the effects of the discharge on the dissolved oxygen levels in the receiving stream.

A 3010 foot stream segment following the discharge was evaluated to determine if BOD<sub>5</sub>, total kjeldahl nitrogen (TKN), or dissolved oxygen (DO) limits were needed to comply with water quality standards and prevent antidegradation to this Tier II water. To comply with antidegradation criteria for DO, TKN, and BOD<sub>5</sub>, no significant lowering of DO is allowed. Significant lowering is defined as more than 0.2 mg/l from the existing level (90 percent DO saturation value).

A minimum DO limit of 6.4 mg/l was required in the 2004 permit issuance to comply with the antidegradation requirements. The critical flow frequencies have been updated for this permit issuance. A significant decrease in the receiving stream flows required an update to the model. In order to meet the antidegradation requirements with the new receiving stream flow, an effluent DO concentration of 6.8 mg/l, a TKN value of 16.0 mg/l, and a secondary treatment limit of 25 mg/l for BOD<sub>5</sub> were required to be used in the model input. The background DO level of the receiving stream is 7.56 mg/l. The model predicted an initial

DO concentration of 7.42 mg/l after initial mixing. Following initial mixing the DO decreases to a minimum of 7.36 mg/l, corresponding to the maximum DO drop of 0.2 mg/l allowed by antidegradation policy, at a distance of 0.4 miles from the discharge. Thus, a **DO** limit of a minimum of **6.8 mg/l** and a monthly average **BOD<sub>5</sub>** limit of **25 mg/L** is needed to prevent degradation of the receiving stream. See **Attachment G** for the water quality model output and supporting data. Monitoring is to be once per day by grab sample.

The minimum DO limit has been made more stringent, increasing from 6.4 mg/l to 6.8 mg/l. A schedule to achieve compliance with this more stringent limit is not included in the permit given that the minimum DO reported on the facility's DMRs has been 7.14 mg/L and thus is already in compliance with the new limit. See **Attachment F** for the facility DMR data.

**Total Suspended Solids (TSS)** -- Secondary treatment standards as mandated by the federal technology-based guidelines (40 CR Part 133.102) can be applied to TSS limits. Effluent limits of **30 mg/l** as a monthly average and **45 mg/l** as a maximum weekly average have been required for TSS with monitoring at once per month of discharge by grab sample.

**Biochemical Oxygen Demand (BOD<sub>5</sub>)** -- Secondary treatment standards as mandated by the federal technology-based guidelines (40 CR Part 133.102) can be applied to BOD<sub>5</sub> limits. Effluent limits of 30 mg/L as a monthly average and 45 mg/L as a maximum weekly average were required for BOD<sub>5</sub> in the 2004 permit with monitoring at once per month of discharge by grab sample. In order to meet the antidegradation requirements for DO, as discussed previously, a monthly average limit of **25 mg/L** and a maximum weekly average limit of **37 mg/L** are required. These water-quality based limits are more stringent than the current technology-based secondary treatment standards and will be the new limits with the same monitoring type and frequency. The corresponding new loading limits are **1.4 kg/d** monthly average and **2.0 kg/d** maximum weekly average.

The BOD<sub>5</sub> limits have been made more stringent, decreasing from 30/45 mg/L to 25/37 mg/L. A schedule to achieve compliance with this more stringent limit is not included in the permit given that the monthly and weekly averages reported on the facility's DMRs have been less than the new limits and thus the facility is already in compliance with the new limits. See **Attachment F** for the facility DMR data.

**E. coli** -- Ultraviolet disinfection is used at this facility. In accordance with 9 VAC 25-260-70, all sewage discharges shall disinfect to achieve the applicable bacteria concentrations prior to discharge. The applicable water quality standard for e. coli is a maximum monthly average, calculated as a geometric mean, of **126n/100 mL**. Proper disinfection and compliance with the water quality standards will be assured with once per week e. coli monitoring. Monitoring is to be once per week by grab samples.

#### C. Effluent Limitations for Toxic Pollutants

**Ammonia as Nitrogen --** The 90th percentile temperature and pH data from STORET monitoring station 4AECR003.02 on Elk Creek were used to determine the antidegradation wasteload allocations (AWLAs). The AWLAs for the receiving stream were used in the STATS 2.0.4 program to determine the reasonable potential to exceed the water quality standards.

For the Tier II receiving stream, antidegradation baselines were established to allocate no more than 25 percent of the unused assimilative capacity for the protection of aquatic life. Since no data exists for the stream, the existing background concentrations of pollutants are assumed to be zero. Thus, baselines are equal to 25 percent of the criteria as listed in Virginia's Water Quality Standards (9 VAC 25-260-00 et seq).

The acute and chronic AWLAs for ammonia were input into the agency STATS program together with one datum value of 9 mg/l. **Attachment F** contains the spreadsheet used to calculate the stream standards and antidegradation wasteload allocations and the results of the reasonable potential determination for ammonia (STATS program). The STATS program determined that a chronic-based limit of **13 mg/L** is needed for ammonia as nitrogen. Monitoring is to once per month by grab samples.

A TKN value of 16 mg/L was required to be input into the Regional Model for Free Flowing Streams in order to not result in an antidegradation violation. The Agency's default assumption is that TKN is equal to ammonia plus 3 mg/L. Therefore, the ammonia limit of 13 mg/L is also protective of the TKN and no TKN limit is required.

17. **Basis for Sludge Use and Disposal Requirements:** Since the facility is contracting with Crowe Septic, LLC of Hardy, VA for the removal and transport sludge, there are no limits or monitoring requirements associated with sludge use or disposal beyond compliance with the Sludge Management Plan approved with the issuance of the permit.
18. **Antibacksliding Statement:** No permit limits have been made less stringent. Therefore, this permit issuance complies with antibacksliding requirements.
19. **Compliance Schedules:** For this reissuance, there are no compliance schedules.
20. **Special Conditions:** A brief rationale for each special condition contained in the permit is given below.
  - A. **Compliance Reporting under Part I.A**  
**Rationale:** Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when toxic pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.
  - B. **95% Capacity Reopener (Part I.B.2)**  
**Rationale:** Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 2 for all POTW and

PVOTW permits.

C. **CTO, CTC Requirement (Part I.B.3)**

Rationale: Required by Code of Virginia 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790.

D. **Operations and Maintenance Manual Requirement (Part I.B.4)**

Rationale: Required by Code of Virginia 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190 E.

E. **Licensed Operator Requirement (Part I.B.5)**

Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 D and the Code of Virginia 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators.

F. **Reliability Class (Part I.B.6)**

Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

G. **Sludge Reopener (Part I.B.7)**

Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-220 C4 for all permits issued to treatment works treating domestic sewage.

H. **Sludge Use and Disposal (Part I.B.8)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B 2; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified for sludge use and disposal. Technical requirements may be derived from the Department of Health's Biosolids Use Regulations, 12 VAC 5-585-10 et seq.

I. **Financial Assurance and Disclosure to Purchasers (Part I.B.9)**

Rationale: Required by Code of Virginia 62.1-44.18:3 and the Board's Financial Assurance Regulation, 9 VAC 25-650-10 et seq.

J. **Total Maximum Daily Load (TMDL) Reopener (Part I.B.10)**

Rationale: Section 303(d) of the Clean Water Act requires that total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

**K. Conditions Applicable to All VPDES Permits (Part II)**

Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

**21. Changes to the Permit:**

- A. The special condition boilerplate language has been updated as recommended in the VPDES permit manual.
- B. The minimum dissolved oxygen (DO) limit has been changed from 6.4 mg/L to 6.8 mg/L.
- C. The monthly average and maximum weekly average concentration limits for BOD<sub>5</sub> have been changed from 30 mg/L and 45 mg/L to 25 mg/L and 37 mg/L. The corresponding monthly average and maximum weekly average loading limits for BOD<sub>5</sub> have been changed from 1.7 kg/d and 2.5 kg/d to 1.4 kg/d and 2.0 kg/d.

**22. Variances/Alternate Limits or Conditions:** No variances or alternate limits or conditions are included in this permit.**23. Regulation of Treatment Works Users:** There are no industrial users contributing to the treatment works.**24. Public Notice Information required by 9 VAC 25-31-290 B:**

All pertinent information is on file and may be inspected or copied by contacting **Kevin A. Harlow** at:

**Virginia DEQ**  
**Blue Ridge Regional Office**  
**3019 Peters Creek Road**  
**Roanoke, Virginia 24019**  
**(540) 562-6700**  
**Kevin.Harlow@deq.virginia.gov**

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing if public response is significant. Requests for public hearings shall state the reason why a hearing is requested, the nature of the issues proposed to be raised in the public hearing and a brief explanation of how the requester's interests would be directly and adversely affected by the proposed permit action. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given.

25. **303(d) Listed Segments (TMDL):** The effluent is discharged to an unnamed tributary to Elk Creek in VAW-L25R that is not listed on the 2008 303(d) list as impaired. This unnamed tributary enters Elk Creek in a segment that is listed on Part I of the 2008 303(d) list as impaired due to bacteria.

A TMDL for the Elk Creek watershed (VAW-L25R) received EPA approval on February 2, 2001 and Virginia State Water Control Board approval on June 17, 2004. The discharge is located upstream of the impaired segment and is therefore subject to the Elk Creek waste load allocation of  $<0.1E+12$  cfu/yr. Since the facility is permitted to discharge  $0.032E+12$  cfu/yr at design capacity the permit is consistent with the TMDL's Waste Load Allocation pursuant to 40 CFR §122.44 (d)(1)(vii)(B). The TMDL WLA discussion is included in **Attachment G**.

26. **Additional Comments:**

- A. **Previous Board Action:**
- B. **Staff Comments:**
- C. **Public Comments:**

**Table I**  
**BASIS FOR LIMITATIONS**  
OUTFALL: 001  
DESIGN FLOW: 0.015 MGD

( ) Interim Limitations  
(x) Final Limitations

Effective Dates - From: Commencement of Discharge  
To: Expiration Date

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS			MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	1/Day	Estimate
pH (Standard Units)	1, 3	NA	6.0	NA	1/Day	Grab
BOD <sub>5</sub>	3	25 mg/L 1.4 kg/d	37 mg/L 2.0 kg/d	NA	1/Month	Grab
Dissolved Oxygen	3	NA	NA	6.8 mg/L	1/Day	Grab
Total Suspended Solids	1	30 mg/L 1.7 kg/d	45 mg/L 2.5 kg/d	NA	1/Month	Grab
Ammonia as Nitrogen (NH <sub>3</sub> -N)	3	13 mg/L	13 mg/L	NA	1/Month	Grab
E. coli	3	126n/100 mL (geometric mean)	NA	NA	1/Week	Grab (between 10 am to 4 pm)

1/D-Month = 1/ Month  
1/D-Week = 1/Week  
1/D-Day = 1/Day  
NA = Not Applicable  
NL = No Limitations, monitoring only

The basis for the limitations codes are:

1. Federal Effluent Guidelines: (Secondary Treatment Requirement)

2. Best Professional Judgement

3. Water Quality Standards

4. Other

## **Attachments**

- A. Site Visit Report**
- B. Wastewater Treatment Diagrams**
- C. USGS Topographic Map**
- D. Flow Frequency Memorandum**
- E. Ambient Water Quality Information**
  - **2008 Impaired Waters Report (Excerpt)**
  - **STORET Data (Station 2AECR003.02)**
- F. Wasteload and Limit Calculations**
  - **Mixing Zone Analysis**
  - **Wasteload Allocation Spreadsheet**
  - **STATS Program Results**
  - **Regional Model v4.11 Output**
- G. TMDL Wasteload Allocation**

**Attachment A**

**Site Visit Report**



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

### West Central Regional Office

3019 Peters Creek Road, Roanoke, Virginia 24019

(540) 562-6700 Fax (540) 562-6725

[www.deq.virginia.gov](http://www.deq.virginia.gov)

L. Preston Bryant, Jr.  
Secretary of Natural Resources

David K. Paylor  
Director

Steven A. Dietrich  
Regional Director

SEP 12 2008

Mr. Chuck Hagerty  
CaGNaC, Inc.  
1725 Old Cifax Road  
Goode, VA 24556

Re: Technical and Laboratory Inspection Reports  
Cedar Rock WWTP  
VPDES Permit No. VA0091553

Dear Mr. Hagerty:

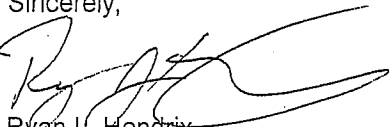
Attached for your review are copies of the technical and laboratory inspection reports for the Cedar Rock WWTP. I conducted the inspection on June 30, 2008.

Please note that page 5 of the technical report summarizes the recommendations for action related to the treatment facility. We request that you respond to this office within **15 days** on these recommendations and provide details of actions taken and/or proposed to correct the deficiencies. All proposed actions must also include a schedule for completion.

With regard to the laboratory inspection, deficiencies were noted with the following sections: Laboratory Records, General Sampling and Analysis, pH Analysis. The deficiencies are discussed in detail on the first two pages of the laboratory report. In view of the significance attached to proper sampling and analysis of samples for use in complying with the terms of the facility's permit, please review the attached report and make the required corrections. Within **15 days** you are required to submit a letter with supporting documentation that corrective actions have been taken.

If you have any questions regarding the reports or the actions required, please contact me at the West Central Regional Office, Roanoke (540-562-6722).

Sincerely,

  
Ryan L. Hendrix  
Compliance Inspector Senior

Attachments

Copies: Garvis Reynolds - Operator  
S. C. Hale, R. L. Hendrix, File - DEQ/WCRO  
S. G. Stell - DEQ/OWCP

## OPERATION AND MAINTENANCE

- stand number of certified operators: II - 1
- hours per day plant is manned: 1 - 2 hours/day, 7 days/week
- Describe adequacy of staffing. ☐ Good ☒ Average ☐ Poor
- Does the plant have an established program for training personnel? ☒ Yes ☐ No
- Describe the adequacy of the training program. ☐ Good ☒ Average ☐ Poor
- Are preventive maintenance tasks scheduled? ☒ Yes ☐ No
- Describe the adequacy of maintenance. ☒ Good ☐ Average ☐ Poor
- Does the plant experience any organic/hydraulic overloading?  
If yes, identify cause and impact on plant: ☐ Yes ☒ No
- Any bypassing since last inspection? ☐ Yes ☒ No
- Is the standby electric generator operational? ☒ Yes ☐ No
- Is the STP alarm system operational? ☒ Yes ☐ No ☐ NA
- How often is the standby generator exercised?  
Power Transfer Switch? **Weekly\*** **Yearly\*** Alarm System? **Daily**
- When were the cross connection control devices last tested on the potable water service?
- Is sludge being disposed in accordance with the approved sludge disposal plan? ☒ Yes\* ☐ No
- Is septage received by the facility?  
Is septage loading controlled?  
Are records maintained? ☐ Yes ☒ No ☐ Yes ☐ No ☒ NA ☐ Yes ☐ No ☒ NA
- Overall appearance of facility: ☒ Good ☐ Average ☐ Poor

Comments: 12. The generator is on an automated schedule to run every Monday at 08:00; however the generator is not operating under load. Reportedly the generator is only operated under load during the yearly service call. See the inspection report summary section for additional information.

14. Sludge is currently pumped and hauled offsite by Wilson's Septic.

Responses with this symbol should be of particular concern and the investigator may want to address the problem in more detail in the Comments Section.

Which of the following records does the plant maintain?

Operational Logs for each unit process	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA
Instrument maintenance and calibration	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA
Mechanical equipment maintenance	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NA
Industrial waste contribution (Municipal Facilities)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> NA

2. What does the operational log contain?

<input checked="" type="checkbox"/> Visual observations	<input checked="" type="checkbox"/> Flow measurement
<input checked="" type="checkbox"/> Laboratory results	<input checked="" type="checkbox"/> Process adjustments
<input checked="" type="checkbox"/> Control calculations	<input checked="" type="checkbox"/> Other (specify) – <b>Air temperature, precipitation &amp; weather conditions</b>

Comments:

3. What do the mechanical equipment records contain?

<input checked="" type="checkbox"/> As built plans and specs	<input type="checkbox"/> Spare parts inventory
<input checked="" type="checkbox"/> Manufacturers instructions	<input checked="" type="checkbox"/> Equipment/parts suppliers
<input checked="" type="checkbox"/> Lubrication schedules	<input type="checkbox"/> Other (specify)

Comments: **Lubrication schedules are included in the manufacturers' instructions.**

4. What do the industrial waste contribution records contain (Municipal Only)? **NA**

<input type="checkbox"/> Waste characteristics	<input type="checkbox"/> Locations and discharge types
<input type="checkbox"/> Impact on plant	<input type="checkbox"/> Other (specify)

Comments:

5. Which of the following records are kept at the plant and available to personnel?

<input checked="" type="checkbox"/> Equipment maintenance records	<input checked="" type="checkbox"/> Operational Log
<input type="checkbox"/> Industrial contributor records	<input checked="" type="checkbox"/> Instrumentation records
<input checked="" type="checkbox"/> Sampling and testing records	

6. Records not normally available to plant personnel and their location: **None**

7. Were the records reviewed during the inspection? ☒ Yes ☐ No

8. Are the records adequate and the O & M Manual current? ☒ Yes ☐ No

9. Are the records maintained for the required 3-year time period? ☒ Yes ☐ No

Comments:

- Do sampling locations appear to be capable of providing representative samples? ☒ Yes ☐ No ☐ NA
- Do sample types correspond to those required by the VPDES permit? ☒ Yes ☐ No ☐ NA
3. Do sampling frequencies correspond to those required by the VPDES permit? ☒ Yes ☐ No ☐ NA
4. Are composite samples collected in proportion to flow? ☐ Yes ☐ No ☒ NA
5. Are composite samples refrigerated during collection? ☐ Yes ☐ No ☒ NA
6. Does plant maintain required records of sampling? ☒ Yes ☐ No ☐ NA
7. Does plant run operational control tests? ☒ Yes\* ☐ No ☐ NA

Comments: 7. Operational control tests include pH, D.O., Alkalinity. See the recommendations for action section for additional information.

#### (D) TESTING

1. Who performs the testing? ☒ Plant ☐ Central Lab ☒ Commercial Lab

Name: BOD, TSS, NH<sub>3</sub> & E. Coli – ProChem Analytical, Inc.

If plant performs any testing, complete 2-4.

2. What method is used for chlorine analysis? NA – UV Disinfection
3. Does plant appear to have sufficient equipment to perform required tests? ☒ Yes ☐ No
4. Does testing equipment appear to be clean and/or operable? ☒ Yes ☐ No

Comments:

#### (E) FOR INDUSTRIAL FACILITIES WITH TECHNOLOGY BASED LIMITS ONLY - NA

1. Is the production process as described in the permit application? (If no, describe changes in comments)  
☐ Yes ☐ No ☒ NA
2. Do products and production rates correspond as provided in the permit application? (If no, list differences)  
☐ Yes ☐ No ☒ NA
3. Has the State been notified of the changes and their impact on plant effluent? Date:  
☐ Yes ☐ No ☒ NA

Comments:

identified at last inspection:

Corrected

Not Corrected

previous inspection as this is the initial inspection for this facility.

---

### SUMMARY

#### Recommendations for action:

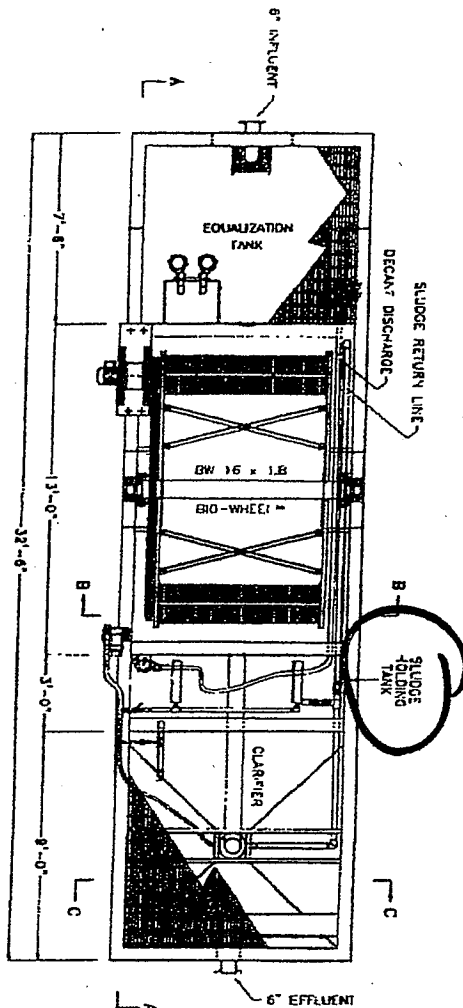
1. Per the facility's Operations and Maintenance (O&M) manual, a 30 minute settleability analysis should be performed on the mixed liquor daily. Additionally, due to the facility operating well below design capacity, it is recommended that a mixed liquor suspended solids (MLSS) analysis be performed at least monthly to ensure an optimal solids inventory is maintained. It may be necessary to perform additional process control testing to provide information necessary to fine tune performance, especially given the current under loaded condition.
2. The RAS rate for May 2008 ( $\approx 0.043$  MGD) is approximately thirteen times the average plant flow (0.0033 MGD). It is recommended the RAS rate be lowered to optimize the hydraulic retention time (HRT) of the de-nitrification tank.
3. The facility's flow meter is due for recalibration. To ensure flow measurements are accurate and representative, the facility's flow meter needs to be calibrated at least annually.
4. It is recommended that the Bio-wheel rotation speed be reduced to the rate described in the O&M manual or to control basin D.O. at 1.0 – 2.0 mg/L, as described in the O&M manual.

#### Comments:

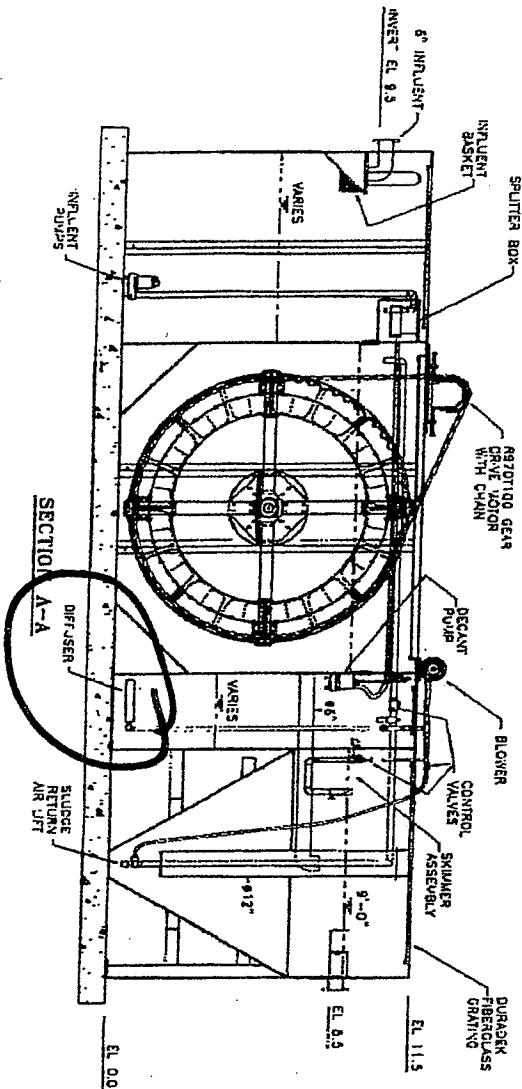
- The generator is on an automated schedule to run weekly; however the generator is not operating under load. Reportedly the generator is only operated under load during the yearly service call. It is suggested the generator be operated under load at least monthly to exercise the transfer switch.

## **Attachment B**

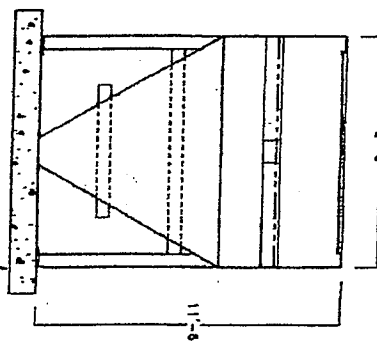
### **Wastewater Treatment Diagrams**



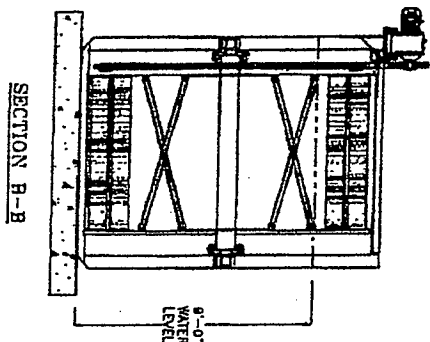
PLAN VIEW



SECTION A-A



SECTION C-C



SECTION B-B

PATENT NO. US D452,295, PATENT NO. US 6,572,774, PATENT NO. 6,613,229 AND OTHER PATENTS PENDING

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DRAWING NUMBER 1618-0084-000-001



BIO-WHEEL™

SHEET NUMBER

OF

SCALE

WASTEWATER TECHNOLOGY INC.

P.O. BOX 737  
MONTEREY, VIRGINIA 24465  
PH 1 (800)-741-2341 FAX (540)-468-3129

BW 16 x 1.8

18,000 GPD

CEDAR ROCK

Wastewater Treatment Plant

APPROVED BY

DDR

PREPARED BY

LR

DRAWING NAME

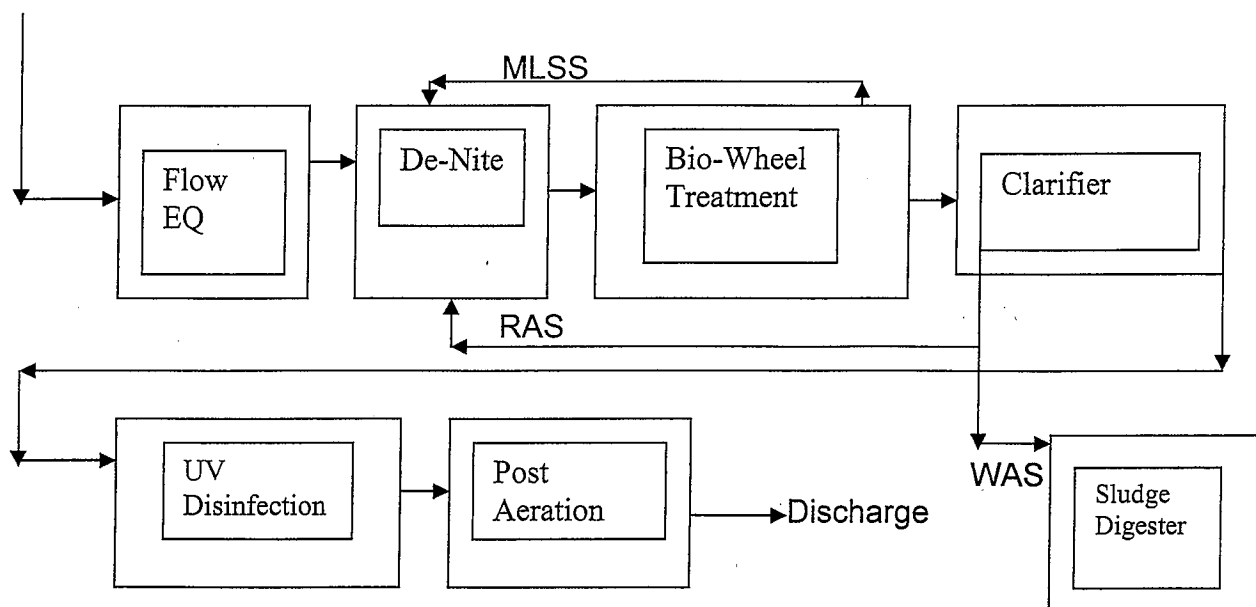
Arrangement

Tank

Plot DATE

05-20-04

## PROCESS FLOW DIAGRAM



## PERMIT

The plant is a discharging system as is governed by the Department of Environmental Quality's VPDES (Virginia Pollution Discharge Elimination Permit) Permit Program. The facility permit # is VA0091553. This permit establishes the limits of several parameters that are tested on a regular basis with results reported monthly to the DEQ – West Central Regional Office in Roanoke, Virginia. A copy of the permit is located in the appendix of this manual.

The permit limits are:

### BioChemical Oxygen Demand

Average concentration mg/l.	30mg/l
Max. concentration mg/l.	45 mg/l
Average concentration kg/d.	1.7 kg/d
Max. concentration kg/d.	2.5 kg/d

### Total Suspended Solids

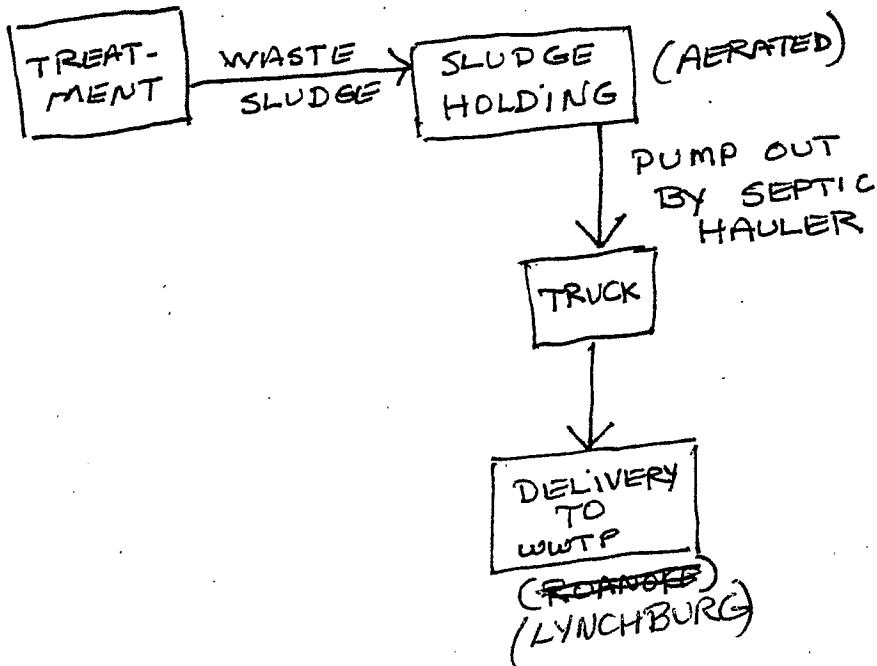
Average concentration mg/l.	30mg/l
Max. concentration mg/l.	45 mg/l
Average concentration kg/d.	1.7 kg/d
Max. concentration kg/d.	2.5 kg/d

pH

## CEDAR ROCK SLUDGE PROCESS NARRATIVE

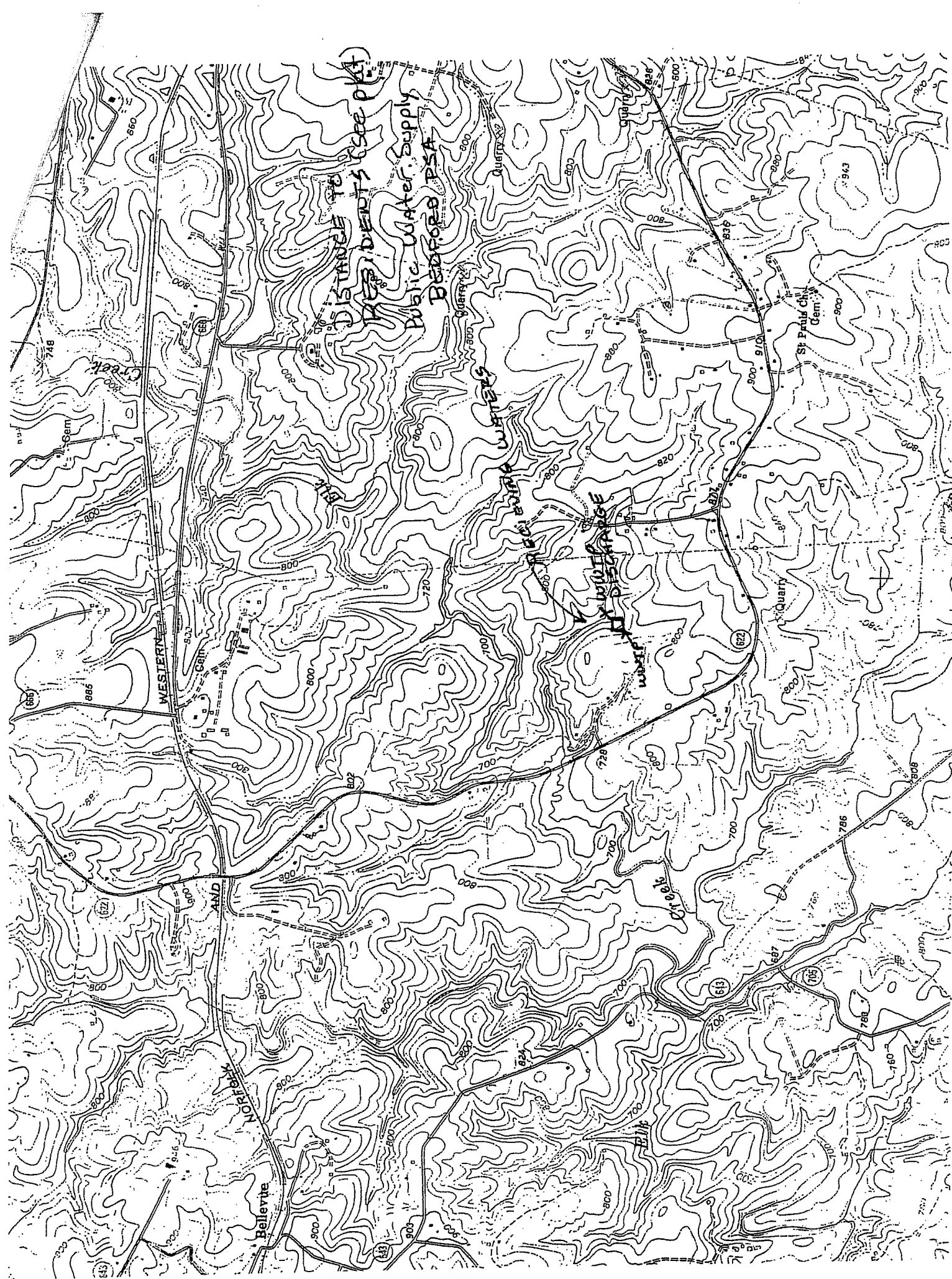
Sludge will be produced at the Cedar Rock WWTP through the extended aeration process and the fixed film process. The operator will waste sludge on the required frequency to maintain optimal operational conditions at the plant. The packaged treatment plant is equipped with a sludge holding tank which is aerated to continue the oxidation of the wasted sludge. Provisions are provided for the decanting of clarified water from the sludge holding tank and returning it to the treatment works. Periodically a septic hauler will pump out the sludge holding tank and deliver the wasted sludge to a municipal treatment works. Crowe Septic, LLC has agreed to provide this service to Cedar Rock and a signed contract between the parties is provided. The final destination of the wasted sludge will be the City of Roanoke Water Pollution Control Plant.

### LINE DRAWING



## **Attachment C**

### **USGS Topographic Map**



## **Attachment D**

### **Flow Frequency Memorandum**

# MEMORANDUM

## VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

### BLUE RIDGE REGIONAL OFFICE

**SUBJECT:** Flow Frequency Determination  
Cedar Rock WWTP - VA#0091553

**TO:** Permit File

**FROM:** Kevin Harlow, BRRO

**DATE:** September 19, 2009

The Cedar Rock WWTP discharges to an UT to Elk Creek near Forest, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The USGS has maintained a continuous record gage on the Big Otter River near Evington, VA #02061500. The critical flow frequencies at the discharge point were determined using a drainage area comparison with the continuous record gage. The values for the reference gauge and the discharge point are presented below:

<b>Reference Gauge</b> <b>Pigg River near Sandy Level, VA (#02058400):</b> Drainage Area = 320 mi <sup>2</sup> 1Q10 = 18 cfs      High Flow 1Q10 = 85 cfs 7Q10 = 21 cfs      High Flow 7Q10 = 98 cfs 30Q5 = 48 cfs      High Flow 30Q10 = 131 cfs 30Q10 = 31 cfs      HM = 132 cfs	<b>Discharge Point</b> <b>UT to Elk Creek:</b> Drainage Area = 1.57 mi <sup>2</sup> 1Q10 = 0.09 cfs      High Flow 1Q10 = 0.42 cfs 7Q10 = 0.10 cfs      High Flow 7Q10 = 0.48 cfs 30Q5 = 0.24 cfs      High Flow 30Q10 = 0.64 cfs 30Q10 = 0.15 cfs      HM = 0.65 cfs
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

The high flow months are January through May. This analysis does not address any withdrawals or discharges lying upstream of the discharge point.

## **Attachment E**

### **Ambient Water Quality Information**

- **STORET Data (Station 2-SMH000.08)**
- **2008 Impaired Waters Report (Excerpt)**



# 2008 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

### Roanoke and Yadkin River Basins

#### Fact Sheet prepared for DCR Watershed: L25\*

Cause Group Code: **L25R-01-BAC**

**Big Otter River, Elk Creek and North Otter Creek**

Location: Big Otter River from the mouth of North Otter Creek downstream to the confluence of the Little Otter River. Elk Creek from the Rt. 644 crossing at Perrowville downstream to the Elk Creek confluence on the Big Otter River. North Otter Creek from near the Rt. 122 crossing downstream to the its mouth on the Big Otter River.

Note: The original 1998 bacteria 7.28 mile impairment on Elk Creek is extended with the 2004 IR to include the lower portion of North Otter Creek and the Big Otter River.

City / County: Bedford Co.

Use(s): Recreation

Cause(s) /

VA Category: Escherichia coli/ 4A

Fecal Coliform/ 4A

The Big Otter River / Elk Creek Bacteria Total Maximum Daily Load (TMDL) Study is complete receiving US EPA approval on 2/02/2001 [Fed. ID 1498/9595] and SWCB approval on 6/17/2004 (formerly VAW-L25R-01). The Bacteria Implementation Plan received SWCB approval on 3/27/2007. The waters are therefore Category 4A for bacteria. The Bacteria TMDL Study encompasses the Little Otter drainage (L26R) including Machine Creek (L26R), Big Otter drainage (L23R, L24R, L27R, L28R- mainstem delisted 2008 13.98 mi.) including Sheeps (L23R), North Otter (L24R) and Elk (L25R) Creeks. Allocation scenario development is for the entire drainage to provide pollutant reductions for all watersheds contributing to the bacteria impairment. Escherichia coli (E.coli) replaces fecal coliform (FC) bacteria as the indicator as per Water Quality Standards [9 VAC 25-260-170. Bacteria; other waters]. The entirety of the approved study and allocations can be viewed at <http://www.deq.virginia.gov>.

The 2004 extension is the result of additional data collections made while conducting the TMDL Study. The bacteria impairment encompasses the original Elk Creek 7.28 miles and the total 2004 extension of 30.10 miles. The original 1998 and 2004 extensions totaling 37.38 miles are described below:

The 1998 Elk Creek (L25R) original 7.27 mile bacteria upper limit is at Rt. 622 west of Forest (Forest Quad 37°20'25" / 79°21'33") and ending at its mouth on the Big Otter River (Goode Quad 37°18'37" / 79°23'38"). The 2004 extension runs from near Perrowville (37°24'58" / 79°21'07") downstream to the Rt. 622 crossing adding 11.86 miles. The original 1998 and 2002 303(d) Listing basis is for fecal coliform bacteria exceedences at 4AECR003.02. These data show contravention of the former WQS 1000 cfu/100 ml fecal coliform criterion in greater than 25 percent of the samples collected.

Elk Creek (19.13 miles)

4AECR016.66- (Below Rt. 664 near Norwood) Six of nine E.coli samples exceed the 235 cfu/100 ml instantaneous criterion. The exceedence range is from 320 to 1600 cfu/100 ml.

4AECR007.42- (intersection of Routes 643 and 705) E.coli exceedences are found in six of nine samples with a range of exceedence from 320 cfu/100 ml to greater than 2000. Each in excess of the instantaneous criterion.

4AECR003.02- (Rt. 668 Bridge) Six of nine E.coli samples exceed the instantaneous criterion. The exceeding values range from 300 to greater than 2000 cfu/100 ml.

The 2004 North Otter Creek (L24R) extension is 6.55 miles. The extension includes the lower portion of North Otter Creek on the Sedalia Quad (37°27'12" / 79°27'55") from near the Route 122 crossing extending downstream to its mouth on the Big Otter River (Sedalia Quad (37°23'04" / 79°26'40").

4ANOT001.06- (Route 644 Bridge) There are no additional data beyond the 2006 Integrated Report (IR). Exceedences within the 2008 data window are four of 13 FC samples with the same range of exceedence as in 2006. The 2006 IR reports seven of 20 FC samples exceed the 400 cfu/100 ml instantaneous criterion. The range of exceedence is from 700 cfu/100 ml to greater than 8000. The 2004 IR reports 10 of 28 samples in excess of the instantaneous criterion for fecal coliform bacteria. The range of exceedence is from 500 cfu/100 ml to greater than 8000.



# 2008 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

### Roanoke and Yadkin River Basins

#### Fact Sheet prepared for DCR Watershed: L25\*

Big Otter River (L25R; 2004 extension of 11.70 miles.)

The Big Otter River (L25R) from the confluence of North Otter Creek (Sedalia Quad 37°27'12" / 79°27'55") river mile 32.01 downstream to the confluence of Little Otter River on the Big Otter River (Goode Quad 37°16'28" / 79°24'19") river mile 20.27.

4ABOR029.74- (Rt.221 Bridge intersection Rt.'s 221 & 670) Three of nine E.coli samples exceed the 235 cfu/100 ml instantaneous criterion. Exceeding values range from 420 cfu/100 ml and greater than 2000. Previous assessments found two of two FC samples exceed the 400 cfu/100 ml instantaneous criterion. Exceeding values are 2100 and 4900 cfu/100 ml.

4ABOR024.46- (Rt. 460 Bridge near intersection Rt.'s 460 & 706) Two of two FC samples exceed the 400 cfu/100 ml instantaneous criterion. Exceeding values are 7000 cfu/100 ml and greater than 160,000.

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-L25R_BOR01A02 / Big Otter River Lower / Big Otter River mainstem from the mouth of the Little Otter River upstream to the Elk Creek confluence on the Big Otter River.	4A Escherichia coli	2008	2001	4.42
VAW-L25R_ECR01A00 / Elk Creek / Elk Creek mainstem from its mouth on the Big Otter River upstream to the Rt. 622 crossing west of Forest, VA.	4A Escherichia coli	2008	2001	7.27
VAW-L25R_ECR02A02 / Elk Creek Middle / Elk Creek mainstem from and unnamed tributary near Norwood (37°20'25" / 79°21'32") Rt. 622 crossing, upstream to near Perrowville (37°24'58" / 79°21'07") at another unnamed tributary.	4A Escherichia coli	2008	2001	11.86

Big Otter River, Elk Creek and North Otter Creek

DCR Watershed: L25\*

Estuary (Sq. Miles) Reservoir (Acres) River (Miles)

Escherichia coli - Total Impaired Size by Water Type:

23.55

Assessment Unit / Water Name / Description	Cause Category / Name	Cycle First Listed	TMDL Schedule	Size
VAW-L25R_BOR02A02 / Big Otter River Upper 1 / Big Otter River mainstem from the confluence of Elk Creek upstream to the mouth of Roaring Run.	4A Fecal Coliform	2004	2001	5.92
VAW-L25R_BOR03A04 / Big Otter River Upper 2 / Confluence of North Otter Creek downstream to the mouth of Roaring Run.	4A Fecal Coliform	2004	2001	1.36

Big Otter River, Elk Creek and North Otter Creek

DCR Watershed: L25\*

Estuary (Sq. Miles) Reservoir (Acres) River (Miles)

Fecal Coliform - Total Impaired Size by Water Type:

7.28



# 2008 Impaired Waters

## Categories 4 and 5 by DCR Watershed\*

---

### Roanoke and Yadkin River Basins

**Fact Sheet prepared for DCR Watershed: L25\***

**Sources:**

Livestock (Grazing or  
Feeding Operations)

On-site Treatment Systems  
(Septic Systems and Similar  
Decentralized Systems)

Unspecified Domestic  
Waste

Wildlife Other than  
Waterfowl

\*Header Information: Location, City/County, Cause/VA Category and Narratives; describe the entire extent of the Impairment. Sizes presented are for Assessment Units (AUs) lying within the DCR Watershed boundary noted above.

## **Attachment F**

### **Wasteload and Limit Calculations**

- **Mixing Zone Analysis**
- **Wasteload Allocation Spreadsheet**
- **STATS Program Results**
- **Regional Model v4.11 Output**

## Mixing Zone Predictions for Cedar Rock WWTP

Effluent Flow = 0.015 MGD  
Stream 7Q10 = 0.07 MGD  
Stream 30Q10 = 0.10 MGD  
Stream 1Q10 = 0.06 MGD  
Stream slope = 0.015 ft/ft  
Stream width = 5 ft  
Bottom scale = 3  
Channel scale = 1

---

### Mixing Zone Predictions @ 7Q10

Depth = .0843 ft  
Length = 183.39 ft  
Velocity = .3121 ft/sec  
Residence Time = .0068 days

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

---

### Mixing Zone Predictions @ 30Q10

Depth = .1014 ft  
Length = 156.63 ft  
Velocity = .3512 ft/sec  
Residence Time = .0052 days

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

---

### Mixing Zone Predictions @ 1Q10

Depth = .0781 ft  
Length = 195.67 ft  
Velocity = .2971 ft/sec  
Residence Time = .183 hours

#### Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

---

Station\_ID 4AECR003.02 ;STA #11 RT. 668 BRIDGE (BEDFORD COUNTY)  
 Stream Elk Creek

Date	Wet Season	Field_pH	DO_Probe	Temp_Celsuis	Hardness (mg/L)
8/19/1992	0	8.82	8.8	20.8	34
9/21/1993	0	7.1	7.6	18.7	46
12/7/1993	0	7.1	11.3	7	26
6/22/1994	0	7.23	7.4	23.1	30
9/13/1994	0	7.45	9.3	15.7	32
12/13/1994	0	7.68	13.6	1.2	24
6/14/1995	0	7.3	8.6	19.5	100
9/19/1995	0	7.4	8.5	17.8	38
12/6/1995	0	6.68	12.4	5.5	31
6/4/1996	0	8	7.6	20	26
9/17/1996	0	7.57	8.4	19	41
12/16/1996	0	7.54	12.8	4.2	26.3
6/23/1997	0	7.61	7.5	23.4	31.9
9/29/1997	0	7.55	8.5	16.7	40.4
12/15/1997	0	8.04	14.2	0.3	31.3
6/11/1998	0	7.53	8.3	18.9	27.8
9/16/1998	0	7.45	8.7	20	35.1
12/2/1998	0	7.69	12.7	4.6	28
6/14/1999	0	7.59	8	21.3	34.9
8/19/1999	0	6.71	7.3	22.5	34.5
10/26/1999	0	7.08	10.3	8	
12/27/1999	0	7.96	13.5	1.5	28.5
6/21/2000	0	7.6	6.98	22.8	27.3
7/13/2000	0	7.66	7.6	23.2	26
9/27/2000	0	6.98	8.6	15.3	27.1
11/29/2000	0	7.44	12.41	3.1	21.1
3/14/1994	1	7.8	11.5	7.1	22
3/22/1995	1	7.6	11.2	16	28
3/4/1996	1	7.39	14	2.5	36
3/26/1997	1	7.66	11	10.5	26.8
3/30/1998	1	7.64	9.3	15.5	30.5
3/16/1999	1	7.87	12.3	4.2	22
2/24/2000	1	7.37	11.55	7	21
3/22/2000	1	6.3	11.13	9.14	29
4/24/2000	1	7.46	8.86	13.4	17
4/25/2000	1	6.72	10.32	11.53	27
1/24/2001	1	7.99	13.2	3	23.1
3/12/2001	1	7.77	12.4	10.9	21.4
5/22/2001	1	7.38	7.87	18.7	27.8
90%'ile Wet		7.86	13.0	15.9	30.2
90%'ile		7.97	13.3	22.6	38.7
10%'ile		6.93	7.6	2.9	21.8
50%'ile		7.48	10.1	12.9	31.0

VPDES Permit VA0091553

Cedar Rock WWTP

pH Effluent Data from August, 2008 thru July, 2009

Day	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
1	7.65	7.67	7.75	7.64	7.63	7.63	7.66	7.22	7.61	7.39	7.68	7.65
2	7.63	7.63	7.72	7.66	7.61	7.6	7.61	7.17	7.64	7.35	7.7	7.68
3	7.61	7.66	7.74	7.68	7.65	7.61	7.64	7.12	7.62	7.39	7.68	7.63
4	7.65	7.64	7.76	7.65	7.63	7.63	7.63	7.18	7.6	7.42	7.68	7.68
5	7.64	7.68	7.6	7.63	7.61	7.61	7.61	7.22	7.66	7.47	7.71	7.71
6	7.6	7.63	7.62	7.67	7.62	7.63	7.65	7.26	7.67	7.51	7.69	7.69
7	7.66	7.65	7.64	7.62	7.65	7.68	7.63	7.22	7.66	7.48	7.68	7.71
8	7.64	7.63	7.66	7.68	7.68	7.66		7.26	7.62	7.59	7.65	7.69
9	7.68	7.66	7.64	7.66	7.63	7.64		7.18	7.64	7.61	7.7	7.66
10	7.63	7.63	7.66	7.63	7.64	7.63	7.62	7.22	7.65	7.64	7.67	7.64
11	7.65	7.6	7.63	7.65	7.61	7.66	7.68	7.26	7.62	7.62	7.71	7.62
12	7.63	7.66	7.66	7.67	7.66	7.62	7.66	7.29	7.64	7.6	7.68	7.64
13	7.66	7.7	7.63	7.61	7.63	7.66	7.64	7.24	7.66	7.63	7.66	7.59
14	7.64	7.67	7.65	7.66	7.66	7.64	7.66	7.22	7.64	7.69	7.68	7.61
15	7.61	7.59	7.62	7.64	7.62	7.66	7.71	7.26	7.66	7.69	7.7	7.64
16	7.65	7.62	7.64	7.7	7.61	7.63	7.68	7.21	7.63	7.71	7.67	7.68
17	7.63	7.64	7.66	7.65	7.65	7.6	7.62	7.27	7.61	7.69	7.58	7.66
18	7.59	7.66	7.36	7.61	7.63	7.62	7.64	7.24	7.62	7.66	7.62	7.64
19	7.66	7.61	7.41	7.63	7.61	7.64	7.61	7.29	7.66	7.64	7.66	7.64
20	7.68	7.55	7.5	7.66	7.65	7.62	7.64	7.21	7.63	7.66	7.63	7.61
21	7.65	7.58	7.48	7.66	7.63	7.65	7.65	7.6	7.66	7.63	7.66	7.63
22	7.61	7.6	7.5	7.62	7.61	7.63	7.63	7.57	7.63	7.64	7.66	7.65
23	7.63	7.76	7.63	7.63	7.67	7.64	7.61	7.63	7.66	7.68	7.69	7.63
24	7.66	7.72	7.65	7.66	7.64	7.62	7.63	7.65	7.64	7.71	7.71	7.66
25	7.62	7.7	7.63	7.62	7.62	7.64	7.66	7.63	7.63	7.74	7.68	7.64
26	7.66	7.71	7.65	7.64	7.64	7.66	7.05	7.62	7.67	7.69	7.64	7.68
27	7.64	7.74	7.62	7.61	7.62	7.63	7.1	7.64	7.63	7.67	7.67	7.66
28	7.68	7.72	7.64	7.6	7.65	7.65	7.17	7.62	7.66	7.7	7.7	7.66
29	7.7	7.7	7.66	7.63	7.6	7.68		7.6	7.68	7.68	7.68	7.63
30	7.67	7.72	7.64	7.61	7.53	7.7		7.63	7.36	7.7	7.7	7.64
31	7.65		7.66		7.61	7.66		7.66	7.39	7.67		

7.70 pH - 90%'ile

7.60 pH - 10%'ile

VPDES Permit No. VA0091553

Cedar Rock WWTP

Effluent Data for Dissolved Oxygen (DO), Minimum

DMR Due Date	Minimum DO (mg/L)	Concentration Average mg/L	Concentration Maximum mg/L
10-Aug-2006	7.77	5	5
10-Sep-2006	7.59	6	6
10-Oct-2006	7.62	3	3
10-Nov-2006	8.10	4	4
10-Dec-2006	8.90	7	7
10-Jan-2007	8.00	7	7
10-Feb-2007	9.08	0	0
10-Mar-2007	11.38	15	15
10-Apr-2007	10.86	10	10
10-May-2007	9.73	13	13
10-Jun-2007	7.86	9	9
10-Jul-2007	7.86	10	10
10-Aug-2007	7.88	3	3
10-Sep-2007	7.41	5	5
10-Oct-2007	7.84	2	2
10-Nov-2007	8.88	7	7
10-Dec-2007	8.69	5	5
10-Jan-2008	8.92	12	12
10-Feb-2008	9.17	5	5
10-Mar-2008	9.10	11	11
10-Apr-2008	9.03	11	11
10-May-2008	9.07	7	7
10-Jun-2008	9.00	15	15
10-Jul-2008	7.14	5	5
10-Aug-2008	7.28	8	8
10-Sep-2008	8.02	5	5
10-Oct-2008	7.75	9	9
10-Nov-2008	7.80	0	0
10-Dec-2008	8.20	3	3
10-Jan-2009	8.17	3	3
10-Feb-2009	8.40	7	7
10-Mar-2009	8.70	0	0
10-Apr-2009	8.72	2	2
10-May-2009	7.80	0	0
10-Jun-2009	7.80	4	4
10-Jul-2009	8.22	4	4
<b>Average</b>	8.44	6.17	6.17
<b>Minimum</b>	7.14	0.00	0.00
<b>Maximum</b>	11.38	15.00	15.00

# FRESHWATER WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name:

Cedar Rock STP

Permit No.: VA0091553

Receiving Stream:

UT to Elk Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

## Stream Information

Mean Hardness (as CaCO<sub>3</sub>) = 31 mg/L  
 90% Temperature (Annual) = 22.6 deg C  
 90% Temperature (Wet season) = 15.9 deg C  
 90% Maximum pH = 7.97 SU  
 10% Maximum pH = 6.93 SU  
 Tier Designation (1 or 2) = 2  
 Public Water Supply (PWS) Y/N? = Y  
 Trout Present Y/N? = N  
 Early Life Stages Present Y/N? = Y

## Stream Flows

1Q10 (Annual) = 0.06 MGD  
 7Q10 (Annual) = 0.07 MGD  
 30Q10 (Annual) = 0.41 MGD  
 1Q10 (Wet season) = 0.27 MGD  
 30Q10 (Wet season) = 0.31 MGD  
 30Q5 = 0.15 MGD  
 Harmonic Mean = 0.42 MGD

## Mixing Information

Annual - 1Q10 Mix = 100 %  
 - 7Q10 Mix = 100 %  
 - 30Q10 Mix = 100 %  
 Wet Season - 1Q10 Mix = 100 %  
 - 30Q10 Mix = 100 %

## Effluent Information

Mean Hardness (as CaCO<sub>3</sub>) = 100 mg/L  
 90% Temp (Annual) = 22.6 deg C  
 90% Temp (Wet season) = 15.9 deg C  
 90% Maximum pH = 7.7 SU  
 10% Maximum pH = 7.6 SU  
 Discharge Flow = 0.015 MGD

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Acenaphthene	5	-	-	6.7E+02	9.9E+02	-	-	7.3E+03	1.1E+04	-	-	7.2E+01	1.0E+02	-	-	7.4E+02
Acrolein	0	-	-	6.1E+00	9.3E+00	-	-	6.7E+01	1.0E+02	-	-	6.1E-01	9.3E-01	-	-	6.7E+00
Acrylonitrile <sup>f</sup>	0	-	-	5.1E-01	2.5E+00	-	-	1.5E+01	7.3E+01	-	-	5.1E-02	2.5E-01	-	-	1.5E+00
Aldrin <sup>c</sup>	0	3.0E+00	-	4.9E-04	5.0E-04	1.5E+01	-	1.4E-02	1.5E-02	7.5E-01	-	4.9E-05	5.0E-05	3.8E+00	-	1.4E-03
Ammonia-N (mg/l) (Yearly)	0	1.01E+01	1.54E+00	-	-	5.1E+01	4.4E+01	-	-	2.53E+00	3.84E-01	-	-	1.3E+01	1.1E+01	-
Ammonia-N (mg/l) (High Flow)	0	9.22E+00	2.38E+00	-	-	1.8E+02	5.2E+01	-	-	2.31E+00	5.95E-01	-	-	4.4E+01	1.3E+01	-
Anthracene	0	-	-	8.3E+03	4.0E+04	-	-	9.1E+04	4.4E+05	-	-	8.3E+02	4.0E+03	-	-	9.1E+03
Antimony	0	-	-	5.6E+00	6.4E+02	-	-	6.2E+01	7.0E+03	-	-	5.6E-01	6.4E+01	-	-	6.2E+00
Arsenic	0	3.4E+02	1.5E+02	1.0E+01	-	1.7E+03	8.5E+02	1.1E+02	-	8.5E+01	3.8E+01	1.0E+00	-	4.3E+02	2.1E+02	1.1E+01
Barium	0	-	-	2.0E+03	-	-	-	2.2E+04	-	-	-	2.0E+02	-	-	-	2.2E+03
Benzene <sup>c</sup>	0	-	-	2.2E+01	5.1E+02	-	-	6.4E+02	1.5E+04	-	-	2.2E+00	5.1E+01	-	-	6.4E+01
Benzidine <sup>f</sup>	0	-	-	8.6E-04	2.0E-03	-	-	2.5E-02	5.8E-02	-	-	8.6E-05	2.0E-04	-	-	2.5E-03
Benzo (a) anthracene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01
Benzo (b) fluoranthene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01
Benzo (k) fluoranthene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01
Benzo (a) pyrene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01
Bis(2-Chloroethyl) Ether <sup>f</sup>	0	-	-	3.0E-01	5.3E+00	-	-	8.7E+00	1.5E+02	-	-	3.0E-02	5.3E-01	-	-	8.7E-01
Bis(2-Chloroisopropyl) Ether <sup>f</sup>	0	-	-	1.4E+03	6.5E+04	-	-	1.5E+04	7.2E+05	-	-	1.4E+02	6.5E+03	-	-	1.5E+03
Bis(2-Ethylhexyl) Phthalate <sup>f</sup>	0	-	-	1.2E+01	2.2E+01	-	-	3.5E+02	6.4E+02	-	-	1.2E+00	2.2E+00	-	-	3.5E+01
Bromoform <sup>c</sup>	0	-	-	4.3E+01	1.4E+03	-	-	1.2E+03	4.1E+04	-	-	4.3E+00	1.4E+02	-	-	1.2E+02
Butylbenzylphthalate	0	-	-	1.5E+03	1.9E+03	-	-	1.7E+04	2.1E+04	-	-	1.5E+02	1.9E+02	-	-	1.7E+03
Cadmium	0	1.6E+00	5.9E-01	5.0E+00	-	7.9E+00	3.3E+00	5.5E+01	-	4.0E-01	1.5E-01	5.0E-01	-	2.0E+00	8.3E-01	5.5E+00
Carbon Tetrachloride <sup>c</sup>	0	-	-	2.3E+00	1.6E+01	-	-	6.7E+01	4.6E+02	-	-	2.3E-01	1.6E+00	-	-	6.7E+00
Chlordane <sup>c</sup>	0	2.4E+00	4.3E-03	8.0E-03	8.1E-03	1.2E+01	2.4E-02	2.3E-01	2.3E-01	6.0E-01	1.1E-03	8.0E-04	8.1E-04	3.0E+00	6.1E-03	2.3E-02
Chloride	0	8.6E+05	2.3E+05	2.5E+05	-	4.3E+06	1.3E+06	2.8E+06	-	2.2E+05	5.8E+04	2.5E+04	-	1.1E+06	3.3E+05	2.8E+05
TRC	0	1.9E+01	1.1E+01	-	-	9.5E+01	6.2E+01	-	-	4.9E+00	2.8E+00	-	-	2.4E+01	1.6E+01	-
Chlorobenzene	0	-	-	1.3E+02	1.6E+03	-	-	1.4E+03	1.8E+04	-	-	1.3E+01	1.6E+02	-	-	1.4E+02

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane <sup>g</sup>	0	-	-	4.0E+00	1.3E+02	-	-	1.2E+02	3.8E+03	-	-	4.0E-01	1.3E+01	-	-	1.2E+01	3.8E+02	-	-	1.2E+01	3.8E+02
Chloroform	0	-	-	3.4E+02	1.1E+04	-	-	3.7E+03	1.2E+05	-	-	3.4E+01	1.1E+03	-	-	3.7E+02	1.2E+04	-	-	3.7E+02	1.2E+04
2-Chloronaphthalene	0	-	-	1.0E+03	1.6E+03	-	-	1.1E+04	1.8E+04	-	-	1.0E+02	1.6E+02	-	-	1.1E+03	1.8E+03	-	-	1.1E+03	1.8E+03
2-Chlorophenol	0	-	-	8.1E+01	1.5E+02	-	-	8.9E+02	1.7E+03	-	-	8.1E+00	1.5E+01	-	-	8.9E+01	1.7E+02	-	-	8.9E+01	1.7E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	-	-	4.2E-01	2.3E-01	-	-	2.1E-02	1.0E-02	-	-	1.0E-01	5.8E-02	-	-	1.0E-01	5.8E-02	-	-
Chromium III	0	3.0E+02	3.7E+01	-	-	1.5E+03	2.1E+02	-	-	7.4E+01	9.3E+00	-	-	3.7E+02	5.3E+01	-	-	3.7E+02	5.3E+01	-	-
Chromium VI	0	1.6E+01	1.1E+01	-	-	8.0E+01	6.2E+01	-	-	4.0E+00	2.8E+00	-	-	2.0E+01	1.6E+01	-	-	2.0E+01	1.6E+01	-	-
Chromium, Total	0	-	-	1.0E+02	-	-	-	1.1E+03	-	-	-	1.0E+01	-	-	-	1.1E+02	-	-	-	1.1E+02	-
Chrysene <sup>c</sup>	0	-	-	3.8E-03	1.8E-02	-	-	1.1E-01	5.2E-01	-	-	3.8E-04	1.8E-03	-	-	1.1E-02	5.2E-02	-	-	1.1E-02	5.2E-02
Copper	0	6.3E+00	4.4E+00	1.3E+03	-	3.2E+01	2.5E+01	1.4E+04	-	1.6E+00	1.1E+00	1.3E+02	-	7.9E+00	6.2E+00	1.4E+03	-	7.9E+00	6.2E+00	1.4E+03	-
Cyanide, Free	0	2.2E+01	5.2E+00	1.4E+02	1.6E+04	1.1E+02	2.9E+01	1.5E+03	1.8E+05	5.5E+00	1.3E+00	1.4E+01	1.6E+03	2.8E+01	7.4E+00	1.5E+02	1.8E+04	2.8E+01	7.4E+00	1.5E+02	1.8E+04
DDD <sup>c</sup>	0	-	-	3.1E-03	3.1E-03	-	-	9.0E-02	9.0E-02	-	-	3.1E-04	3.1E-04	-	-	9.0E-03	9.0E-03	-	-	9.0E-03	9.0E-03
DDE <sup>c</sup>	0	-	-	2.2E-03	2.2E-03	-	-	6.4E-02	6.4E-02	-	-	2.2E-04	2.2E-04	-	-	6.4E-03	6.4E-03	-	-	6.4E-03	6.4E-03
DDT <sup>c</sup>	0	1.1E+00	1.0E-03	2.2E-03	2.2E-03	5.5E+00	5.7E-03	6.4E-02	6.4E-02	2.8E-01	2.5E-04	2.2E-04	2.2E-04	1.4E+00	1.4E-03	6.4E-03	6.4E-03	1.4E+00	1.4E-03	6.4E-03	6.4E-03
Demeton	0	-	1.0E-01	-	-	-	5.7E-01	-	-	2.5E-02	-	-	-	-	1.4E-01	-	-	-	1.4E-01	-	-
Diazinon	0	1.7E-01	1.7E-01	-	-	8.5E-01	9.6E-01	-	-	4.3E-02	4.3E-02	-	-	2.1E-01	2.4E-01	-	-	2.1E-01	2.4E-01	-	-
Dibenz(a,h)anthracene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01	5.2E-01	-	-	1.1E-01	5.2E-01
1,2-Dichlorobenzene	0	-	-	4.2E+02	1.3E+03	-	-	4.6E+03	1.4E+04	-	-	4.2E+01	1.3E+02	-	-	4.6E+02	1.4E+03	-	-	4.6E+02	1.4E+03
1,3-Dichlorobenzene	0	-	-	3.2E+02	9.6E+02	-	-	3.5E+03	1.1E+04	-	-	3.2E+01	9.6E+01	-	-	3.5E+02	1.1E+03	-	-	3.5E+02	1.1E+03
1,4-Dichlorobenzene	0	-	-	6.3E+01	1.9E+02	-	-	6.9E+02	2.1E+03	-	-	6.3E+00	1.9E+01	-	-	6.9E+01	2.1E+02	-	-	6.9E+01	2.1E+02
3,3-Dichlorobenzidine <sup>g</sup>	0	-	-	2.1E-01	2.8E-01	-	-	6.1E+00	8.1E+00	-	-	2.1E-02	2.8E-02	-	-	6.1E-01	8.1E-01	-	-	6.1E-01	8.1E-01
Dichlorobromomethane <sup>c</sup>	0	-	-	5.5E+00	1.7E+02	-	-	1.6E+02	4.9E+03	-	-	5.5E-01	1.7E+01	-	-	1.6E+01	4.9E+02	-	-	1.6E+01	4.9E+02
1,1-Dichloroethane <sup>c</sup>	0	-	-	3.8E+00	3.7E+02	-	-	1.1E+02	1.1E+04	-	-	3.8E-01	3.7E+01	-	-	1.1E+01	1.1E+03	-	-	1.1E+01	1.1E+03
1,2-Dichloroethylene	0	-	-	3.3E+02	7.1E+03	-	-	3.6E+03	7.8E+04	-	-	3.3E+01	7.1E+02	-	-	3.6E+02	7.8E+03	-	-	3.6E+02	7.8E+03
1,2-trans-dichloroethylene	0	-	-	1.4E+02	1.0E+04	-	-	1.5E+03	1.1E+05	-	-	1.4E+01	1.0E+03	-	-	1.5E+02	1.1E+04	-	-	1.5E+02	1.1E+04
2,4-Dichlorophenol	0	-	-	7.7E+01	2.9E+02	-	-	8.5E+02	3.2E+03	-	-	7.7E+00	2.9E+01	-	-	8.5E+01	3.2E+02	-	-	8.5E+01	3.2E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	-	-	1.0E+02	-	-	-	1.1E+03	-	-	-	1.0E+01	-	-	-	1.1E+02	-	-	-	1.1E+02	-
1,3-Dichloropropane <sup>c</sup>	0	-	-	5.0E+00	1.5E+02	-	-	1.5E+02	4.4E+03	-	-	5.0E-01	1.5E+01	-	-	1.5E+01	4.4E+02	-	-	1.5E+01	4.4E+02
1,3-Dichloropropene <sup>c</sup>	0	-	-	3.4E+00	2.1E+02	-	-	9.9E+01	6.1E+03	-	-	3.4E-01	2.1E+01	-	-	9.9E+00	6.1E+02	-	-	9.9E+00	6.1E+02
Dieldrin <sup>c</sup>	0	2.4E-01	5.6E-02	5.2E-04	5.4E-04	1.2E+00	3.2E-01	1.5E-02	1.6E-02	6.0E-02	1.4E-02	5.4E-05	5.4E-05	3.0E-01	7.9E-02	1.5E-03	1.6E-03	3.0E-01	7.9E-02	1.5E-03	1.6E-03
Diethyl Phthalate	0	-	-	1.7E+04	4.4E+04	-	-	1.9E+05	4.8E+05	-	-	1.7E+03	4.4E+03	-	-	1.9E+04	4.8E+04	-	-	1.9E+04	4.8E+04
2,4-Dimethylphenol	0	-	-	3.8E+02	8.5E+02	-	-	4.2E+03	9.4E+03	-	-	3.8E+01	8.5E+01	-	-	4.2E+02	9.4E+02	-	-	4.2E+02	9.4E+02
Dimethyl Phthalate	0	-	-	2.7E+05	1.1E+06	-	-	3.0E+06	1.2E+07	-	-	2.7E+04	1.1E+05	-	-	3.0E+05	1.2E+06	-	-	3.0E+05	1.2E+06
Di-n-Butyl Phthalate	0	-	-	2.0E+03	4.5E+03	-	-	2.2E+04	5.0E+04	-	-	2.0E+02	4.5E+02	-	-	2.2E+03	5.0E+03	-	-	2.2E+03	5.0E+03
2,4-Dinitrophenol	0	-	-	6.9E+01	5.3E+03	-	-	7.6E+02	5.8E+04	-	-	6.9E+00	5.3E+02	-	-	7.6E+01	5.8E+03	-	-	7.6E+01	5.8E+03
2-Methyl-4,6-Dinitrophenol	0	-	-	1.3E+01	2.8E+02	-	-	1.4E+02	3.1E+03	-	-	1.3E+00	2.8E+01	-	-	1.4E+01	3.1E+02	-	-	1.4E+01	3.1E+02
2,4-Dinitrofluorene <sup>c</sup>	0	-	-	1.1E+00	3.4E+01	-	-	3.2E+01	9.9E+02	-	-	1.1E-01	3.4E+00	-	-	3.2E+00	9.9E+01	-	-	3.2E+00	9.9E+01
Dioxin 2,3,7,8- tetrachlorodibenzo-p-dioxin	0	-	-	5.0E-08	5.1E-08	-	-	5.5E-07	5.6E-07	-	-	5.0E-09	5.1E-09	-	-	5.5E-08	5.6E-08	-	-	5.5E-08	5.6E-08
1,2-Diphenylhydrazine <sup>g</sup>	0	-	-	3.6E-01	2.0E+00	-	-	1.0E+01	5.8E+01	-	-	3.6E-02	2.0E-01	-	-	1.0E+00	5.8E+00	-	-	1.0E+00	5.8E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	6.2E+01	8.9E+01	1.1E+00	3.2E-01	6.8E+02	9.8E+02	5.5E-02	1.4E-02	6.2E+00	8.9E+00	2.8E-01	7.9E-02	6.8E+01	9.8E+01	2.8E-01	7.9E-02	6.8E+01	9.8E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	6.2E+01	8.9E+01	1.1E+00	3.2E-01	6.8E+02	9.8E+02	5.5E-02	1.4E-02	6.2E+00	8.9E+00	2.8E-01	7.9E-02	6.8E+01	9.8E+01	2.8E-01	7.9E-02	6.8E+01	9.8E+01
Alpha + Beta Endosulfan	0	-	-	-	-	1.1E+00	3.2E-01	-	-	5.5E-02	1.4E-02	-	-	2.8E-01	7.9E-02	-	-	2.8E-01	7.9E-02	-	-
Endosulfan Sulfate	0	-	-	6.2E+01	8.9E+01	-	-	6.8E+02	9.8E+02	-	-	6.2E+00	8.9E+00	-	-	6.8E+01	9.8E+01	-	-	6.8E+01	9.8E+01
Endrin	0	8.6E-02	3.6E-02	5.9E-02	6.0E-02	4.3E-01	2.0E-01	6.5E-01	6.6E-01	2.2E-02	9.0E-03	5.9E-03	6.0E-03	1.1E-01	5.1E-02	6.5E-02	6.6E-02	1.1E-01	5.1E-02	6.5E-02	6.6E-02
Endrin Aldehyde	0	-	-	2.9E-01	3.0E-01	-	-	3.2E+00	3.3E+00	-	-	2.9E-02	3.0E-02	-	-	3.2E-01	3.3E-01	-	-	3.2E-01	3.3E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)
Ethylbenzene	0	-	-	5.3E+02	2.1E+03	-	-	5.3E+01	2.1E+02	-	-	5.8E+02	2.3E+03	-	-	5.8E+02
Fluoranthene	0	-	-	1.3E+02	1.4E+02	-	-	1.3E+01	1.4E+01	-	-	1.4E+02	1.5E+02	-	-	1.4E+02
Fluorene	0	-	-	1.1E+03	5.3E+03	-	-	1.1E+02	5.3E+02	-	-	1.2E+03	5.8E+03	-	-	1.2E+03
Foaming Agents	0	-	-	5.0E+02	-	-	-	5.0E+01	-	-	-	5.5E+02	-	-	-	5.5E+02
Guthion	0	-	-	1.0E+02	-	-	-	2.5E+03	-	-	-	1.4E+02	-	-	-	1.4E+02
Heptachlor <sup>c</sup>	0	5.2E-01	3.8E-03	7.9E-04	7.9E-04	2.6E+00	2.2E-02	2.3E-02	2.3E-02	1.3E-01	9.5E-04	7.9E-05	7.9E-05	6.5E-01	5.4E-03	2.3E-03
Heptachlor Epoxide <sup>d</sup>	0	5.2E-01	3.8E-03	3.9E-04	3.9E-04	2.6E+00	2.2E-02	1.1E-02	1.1E-02	1.3E-01	9.5E-04	3.9E-05	3.9E-05	6.5E-01	5.4E-03	2.3E-03
Hexachlorobenzene <sup>d</sup>	0	-	-	2.8E-03	2.9E-03	-	-	2.8E-04	2.9E-04	-	-	2.8E-04	2.9E-04	-	-	8.1E-03
Hexachlorobutadiene <sup>d</sup>	0	-	-	4.4E+00	1.8E+02	-	-	4.4E-01	1.8E+01	-	-	1.3E+01	5.2E+02	-	-	1.3E+01
Hexachlorocyclohexane	0	-	-	2.6E-02	4.9E-02	-	-	2.6E-03	4.9E-03	-	-	7.5E-02	1.4E-01	-	-	7.5E-02
Hexachlorocyclohexane Beta BHC <sup>c</sup>	0	-	-	9.1E-02	1.7E-01	-	-	9.1E-03	1.7E-02	-	-	2.6E-01	4.9E-01	-	-	2.6E-01
Hexachlorocyclohexane Gamma-BHC <sup>c</sup> (Lindane)	0	9.5E-01	-	9.8E-01	1.8E+00	4.8E+00	-	2.8E+01	5.2E+01	2.4E-01	-	9.8E-02	1.8E-01	1.2E+00	-	2.8E+00
Hexachlorocyclopentadiene	0	-	-	4.0E+01	1.1E+03	-	-	4.0E+02	1.2E+04	-	-	4.0E+00	1.1E+02	-	-	4.4E+01
Hexachloroethane <sup>d</sup>	0	-	-	1.4E+01	3.3E+01	-	-	1.4E+02	9.6E+02	-	-	1.4E+00	3.3E+00	-	-	4.1E+01
Hydrogen Sulfide	0	-	-	2.0E+00	-	-	-	1.1E+01	-	-	-	5.0E-01	-	-	-	2.8E+00
Indeno (1,2,3-cd) pyrene <sup>c</sup>	0	-	-	3.8E-02	1.8E-01	-	-	1.1E+00	5.2E+00	-	-	3.8E-03	1.8E-02	-	-	1.1E-01
Iron	0	-	-	3.0E+02	-	-	-	3.0E+03	-	-	-	3.0E+01	-	-	-	3.3E+02
Isophorone <sup>d</sup>	0	-	-	3.5E+02	9.6E+03	-	-	1.0E+04	2.8E+05	-	-	3.5E+01	9.6E+02	-	-	1.0E+03
Kepon <sup>e</sup>	0	-	-	0.0E+00	-	-	-	0.0E+00	-	-	-	0.0E+00	-	-	-	0.0E+00
Lead	0	4.3E+01	4.6E+00	1.5E+01	-	2.1E+02	2.6E+01	1.7E+02	-	1.1E+01	1.2E+00	1.5E+00	-	5.3E+01	6.6E+00	1.7E+01
Malathion	0	-	-	1.0E-01	-	-	-	5.7E-01	-	-	-	2.5E-02	-	-	-	1.4E-01
Manganese	0	-	-	5.0E+01	-	-	-	5.0E+02	-	-	-	5.0E+00	-	-	-	5.5E+01
Mercury	0	1.4E+00	7.7E-01	-	-	7.0E+00	4.4E+00	-	-	3.5E-01	1.9E-01	-	-	1.8E+00	1.1E+00	-
Methyl Bromide	0	-	-	4.7E+01	1.5E+03	-	-	5.2E+02	1.7E+04	-	-	4.7E+00	1.5E+02	-	-	5.2E+01
Methylene Chloride <sup>c</sup>	0	-	-	4.6E+01	5.9E+03	-	-	1.3E+03	1.7E+05	-	-	4.6E+00	5.9E+02	-	-	1.3E+02
Methoxychlor	0	-	-	3.0E-02	1.0E+02	-	-	1.7E-01	1.1E+03	-	-	7.5E-03	1.0E+01	-	-	4.3E-02
Mirex	0	-	-	0.0E+00	-	-	-	0.0E+00	-	-	-	0.0E+00	-	-	-	0.0E+00
Nickel	0	9.2E+01	1.0E+01	6.1E+02	4.6E+03	4.6E+02	5.6E+01	6.7E+03	5.1E+04	2.3E+01	2.5E+00	6.1E+01	4.6E+02	1.2E+02	1.4E+01	6.7E+02
Nitrate (as N)	0	-	-	1.0E+04	-	-	-	1.1E+05	-	-	-	1.0E+03	-	-	-	1.1E+04
Nitrobenzene	0	-	-	1.7E+01	6.9E+02	-	-	1.9E+02	7.6E+03	-	-	1.7E+00	6.9E+01	-	-	1.9E+01
N-Nitrosodimethylamine <sup>d</sup>	0	-	-	6.9E-03	3.0E+01	-	-	2.0E-01	8.7E+02	-	-	6.9E-04	3.0E+00	-	-	2.0E-02
N-Nitrosodiphenylamine <sup>d</sup>	0	-	-	3.3E+01	6.0E+01	-	-	9.6E+02	1.7E+03	-	-	3.3E+00	6.0E+00	-	-	9.6E+01
N-Nitrosodi-n-propylamine <sup>d</sup>	0	-	-	5.0E-02	5.1E+00	-	-	1.5E+00	1.5E+02	-	-	5.0E-03	5.1E-01	-	-	1.5E-01
Nonylphenol	0	2.8E+01	6.6E+00	-	-	1.4E+02	3.7E+01	-	-	7.0E+00	1.7E+00	-	-	3.5E+01	9.4E+00	-
Parathion	0	6.5E-02	1.3E-02	-	-	3.3E-01	7.4E-02	-	-	1.8E-02	3.5E-03	-	-	8.1E-02	1.8E-02	-
PCB Total <sup>c</sup>	0	-	-	1.4E-02	6.4E-04	-	-	7.9E-02	1.9E-02	-	-	3.5E-03	6.4E-05	-	-	2.0E-02
Pentachlorophenol <sup>c</sup>	0	8.8E+00	6.7E+00	2.7E+00	3.0E+01	4.4E+01	3.8E+01	7.8E+01	8.7E+02	2.2E+00	1.7E+00	2.7E-01	3.0E+00	1.1E+01	9.4E+00	7.8E+00
Phenol	0	-	-	1.0E+04	8.6E+05	-	-	1.1E+05	9.5E+06	-	-	1.0E+03	8.6E+04	-	-	1.1E+04
Pyrene	0	-	-	8.3E+02	4.0E+03	-	-	9.1E+03	4.4E+04	-	-	8.3E+01	4.0E+02	-	-	9.1E+02
Radionuclides	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gross Alpha Activity (pCi/L)	0	-	-	1.5E+01	-	-	-	1.5E+00	-	-	-	1.7E+01	-	-	-	1.7E+01
Beta and Photon Activity (mrem/yr)	0	-	-	4.0E+00	4.0E+00	-	-	4.0E-01	4.0E-01	-	-	4.4E+00	4.4E+00	-	-	4.4E+00
Radium 226 + 228 (pCi/L)	0	-	-	5.0E+00	-	-	-	5.0E-01	-	-	-	5.5E+00	-	-	-	5.5E+00
Uranium (ug/l)	0	-	-	3.0E+01	-	-	-	3.0E+00	-	-	-	3.3E+01	-	-	-	3.3E+01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	1.7E+02	4.2E+03	1.0E+02	2.8E+01	1.9E+03	4.6E+04	5.0E+00	1.3E+00	1.7E+01	4.2E+02	2.5E+01	7.1E+00	1.9E+02	4.8E+03	2.5E+01	7.1E+00	1.9E+02	4.6E+03
Silver	0	8.7E-01	--	--	--	4.3E+00	--	--	--	2.2E-01	--	--	--	1.1E+00	--	--	--	1.1E+00	--	--	--
Sulfate	0	--	--	2.5E+05	--	--	--	2.8E+08	--	--	--	2.5E+04	--	--	--	2.8E+05	--	--	--	2.8E+05	--
1,1,2,2-Tetrachloroethane <sup>g</sup>	0	--	--	1.7E+00	4.0E+01	--	--	4.9E+01	1.2E+03	--	--	1.7E-01	4.0E+00	--	--	4.9E+00	1.2E+02	--	--	4.9E+00	1.2E+02
Tetrachloroethylene <sup>g</sup>	0	--	--	6.9E+00	3.3E+01	--	--	2.0E+02	9.6E+02	--	--	6.9E-01	3.3E+00	--	--	2.0E+01	9.6E+01	--	--	2.0E+01	9.6E+01
Thallium	0	--	--	2.4E-01	4.7E-01	--	--	2.6E+00	5.2E+00	--	--	2.4E-02	4.7E-02	--	--	2.6E-01	5.2E-01	--	--	2.6E-01	5.2E-01
Toluene	0	--	--	5.1E+02	6.0E+03	--	--	5.6E+03	6.6E+04	--	--	5.1E+01	6.0E+02	--	--	5.6E+02	6.6E+03	--	--	5.6E+02	6.6E+03
Total dissolved solids	0	--	--	5.0E+05	--	--	--	5.5E+06	--	--	--	5.0E+04	--	--	--	5.5E+05	--	--	--	5.5E+05	--
Toxaphene <sup>c</sup>	0	7.3E-01	2.0E-04	2.8E-03	2.8E-03	3.7E+00	1.1E-03	8.1E-02	8.1E-02	1.8E-01	5.0E-05	2.8E-04	2.8E-04	9.1E-01	2.8E-04	8.1E-03	8.1E-03	9.1E-01	2.8E-04	8.1E-03	8.1E-03
Tributyltin	0	4.6E-01	7.2E-02	--	--	2.3E+00	4.1E-01	--	--	1.2E-01	1.8E-02	--	--	5.8E-01	1.0E-01	--	--	5.8E-01	1.0E-01	--	--
1,2,4-Trichlorobenzene	0	--	--	3.5E+01	7.0E+01	--	--	3.9E+02	7.7E+02	--	--	3.5E+00	7.0E+00	--	--	3.9E+01	7.7E+01	--	--	3.9E+01	7.7E+01
1,1,2-Trichloroethane <sup>g</sup>	0	--	--	5.9E+00	1.6E+02	--	--	1.7E+02	4.6E+03	--	--	5.9E-01	1.6E+01	--	--	1.7E+01	4.6E+02	--	--	1.7E+01	4.6E+02
Trichloroethylene <sup>c</sup>	0	--	--	2.5E+01	3.0E+02	--	--	7.3E+02	8.7E+03	--	--	2.5E+00	3.0E+01	--	--	7.3E+01	8.7E+02	--	--	7.3E+01	8.7E+02
2,4,6-Trichlorophenol <sup>c</sup>	0	--	--	1.4E+01	2.4E+01	--	--	4.1E+02	7.0E+02	--	--	1.4E+00	2.4E+00	--	--	4.1E+01	7.0E+01	--	--	4.1E+01	7.0E+01
2-(2,4,5-Trichlorophenoxy)propionic acid (Silvex)	0	--	--	5.0E+01	--	--	--	5.5E+02	--	--	--	5.0E+00	--	--	--	5.5E+01	--	--	--	5.5E+01	--
Vinyl Chloride <sup>g</sup>	0	--	--	2.5E-01	2.4E+01	--	--	7.3E+00	7.0E+02	--	--	2.5E-02	2.4E+00	--	--	7.3E-01	7.0E+01	--	--	7.3E-01	7.0E+01
Zinc	0	5.9E+01	5.8E+01	7.4E+03	2.6E+04	3.0E+02	3.3E+02	8.1E+04	2.9E+05	1.5E+01	1.4E+01	7.4E+02	2.6E+03	7.4E+01	8.2E+01	8.1E+03	2.9E+04	7.4E+01	8.2E+01	8.1E+03	2.9E+04

Notes:

- All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
- Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
- Metals measured as Dissolved, unless specified otherwise
- "C" indicates a carcinogenic parameter
- Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.  
Antidegradation WLAs are based upon a complete mix.
- Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic  
= (0.1(WQC - background conc.) + background conc.) for human health
- WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.2E+00
Arsenic	1.1E+01
Barium	2.2E+03
Cadmium	5.0E-01
Chromium III	3.2E+01
Chromium VI	8.0E+00
Copper	3.2E+00
Iron	3.3E+02
Lead	3.9E+00
Manganese	5.5E+01
Mercury	6.5E-01
Nickel	8.5E+00
Selenium	4.3E+00
Silver	4.3E-01
Zinc	3.0E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

10/13/2009 9:58:12 AM

Facility = Cedar Rock WWTP  
Chemical = Ammonia  
Chronic averaging period = 30  
WLAa = 13  
WLAc = 11  
Q.L. = 0.2  
# samples/mo. = 1  
# samples/wk. = 1

Summary of Statistics:

# observations = 1  
Expected Value = 9  
Variance = 29.16  
C.V. = 0.6  
97th percentile daily values = 21.9007  
97th percentile 4 day average = 14.9741  
97th percentile 30 day average = 10.8544  
# < Q.L. = 0  
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity  
Maximum Daily Limit = 13  
Average Weekly limit = 13  
Average Monthly Limit = 13

The data are:

"Model Run For I:\kaharlow\Cedar Rock WWTP\VA0091553\_09\Technical\model2.mod on 10/19/2009 8:39:50 AM"

"Model is for UT TO ELK CREEK."

"Model starts at the CEDAR ROCK WWTP discharge."

"Background Data"

"Q10"	"CBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.0687,	2,	0,	7.559,	23

"Discharge/Tributary Input Data for Segment 1"

"Flow"	"CBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.015,	25,	16,	6.8,	20

"Hydraulic Information for Segment 1"

"Length"	"width"	"Depth"	"Velocity"
"(mi)"	"(ft)"	"(ft)"	"(ft/sec)"
.57,	2.999,	.109,	.394

"Initial Mix Values for Segment 1"

"Flow"	"DO"	"CBOD"	"nBOD"	"DOSat"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.0837,	7.423,	15.306,	10.089,	8.483,	22.46228

"Rate Constants for Segment 1. - (All units Per Day)"

"k1"	"k1@T"	"k2"	"k2@T"	"kn"	"kn@T"	"BD"	"BD@T"
1.2,	1.344,	20,	21.203,	.45,	.544,	0,	0

"Output for Segment 1"

"Segment starts at CEDAR ROCK WWTP"

"Total"	"Segm."	"Dist."	"DO"	"CBOD"	"nBOD"
"(mi)"	"(mi)"	"(mi)"	"(mg/l)"	"(mg/l)"	"(mg/l)"
0,	0,	0,	7.423,	15.306,	10.089
.1,	.1,	.1,	7.379,	14.99,	10.004
.2,	.2,	.2,	7.354,	14.681,	9.92
.3,	.3,	.3,	7.342,	14.378,	9.837
.4,	.4,	.4,	7.339,	14.081,	9.754
.5,	.5,	.5,	7.343,	13.791,	9.672
.57,	.57,	.57,	7.348,	13.591,	9.615

"END OF FILE"

## **Attachment G**

### **TMDL Wasteload Allocation**

**MEMORANDUM**  
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY  
West Central Regional Office

3019 Peters Creek Rd.

Roanoke, VA 24019

SUBJECT: Elk Creek TMDL Study, Bedford County

TO: Kevin Harlow

FROM: Jason Hill, Greg Anderson

DATE: July 26, 2004

COPIES: Mike McLeod, Jutta Schneider, Charlie Martin, Jon VanSoestbergen, Kip Foster, Marcia Degen

This memo discusses the current Waste Load Allocation (WLA) for Elk Creek and calculates the addition WLA needed to permit the Cedar Rock subdivision in Bedford County. There are currently two point source discharges in the Elk Creek watershed: Gunnoe Sausage Company (VA0001449) and Otter River Elementary School (VA0020851). The total WLA for Elk Creek is  $1.19 \text{ E}+12$  (*Addendum to Big Otter Fecal Coliform TMDL*, page 1). The Load Allocation (LA) is  $2421.6 \text{ E}+12$ , the Margin of Safety is  $127.5 \text{ E}+12$  and the TMDL is  $2549.1 \text{ E}+12$ . The point source load (WLA) in the Total Maximum Daily Load (TMDL) study is less than 1% of the TMDL. The proposed facility will not significantly impact the bacteria load on Elk Creek. The additional annual load is two orders of magnitude below the current WLA (see calculation below).

**Additional WLA Calculation (WQ Standard = Geomean *E. Coli* 126 cfu/100 ml)**

This WLA was calculated using the proposed design flow (18,000) gallons a day using the equation below:

Additional WLA = CFS (of permitted facility) \* Permitted Limit \* (28317/100) \* 60 \* 60 \* 24 \* 365

Additional WLA =  $0.02826 \text{ cfs} * 126 \text{ cfu} * 283.17 * 86400 * 365$

**Additional WLA =  $3.179 \text{ E}+10$**

**Conversions:**

1 MGD = 1.547 cfs , 1 CFS = 28317 mL